Quality Indicators in Critical Care

Improvement in quality is an ongoing process. Various aspects of patient care should be quantified by different indicators to identify the existing level and for targeting next level of care, says, Dr D P Samaddar, HOD, Department of Anaesthesia and Critical Care, Tata Main Hospital, Jamshedpur

A sensation was created throughout the world when Institute of Medicine (IOM) attributed up to 98000 deaths due to preventable medical errors in United States.1 Methodology of this report was challenged but the magnitude of the problem was highlighted again when a conservative estimate by Institute of Medicine and Healthgrades showed that 400,000-1.2 million error-induced deaths had taken place during 1996–2006 in the United States.2 These reports emphasised the essentiality and need for radical change in the practices related to patient safety and implementation of quality parameters in health care establishments, more so in critical care. 3,4 In view of this alarming scenario, improving quality consciousness, identification of quality indicators, monitoring of indicators, and generation of national data base must be considered as the top most priority in Indian scenario for healthcare in general and critical care in particular. This is important, more so in critical care due to rapid growth but limited accountability to the end users.

Table 1 List of SIP/process improvement implemented in critical care unit of TMH:

- Infrastructure and organizational change. Separation of coronary care from Critical care (for noncoronary patients) with deployment of doctor in charge and fixed trained doctors and staff to discharge both administrative and patient care responsibilities.
- Patient management: Implementation of glycemic control, fluid therapy, nutritional support, renal failure prevention, antibiotic protocol, bed sore prevention etc.
- Process related: Handing over –taking over during shift change, hand hygiene, waste management, housekeeping etc.

Quality Indicators

What is quality indicator: Indicator is a statistical data or measure to screen an event. Thus it helps in drawing attention to a particular issue and highlights potential problem so that corrective measures can be taken. Monitoring of indicators can help in evaluating quality of service in clinical setup.
and providing higher level of care in standardised manner.5

**Conceptual basis of Quality Indicators:**
It is ethical and moral responsibility of healthcare providers that quality of care prevailing is optimal under the prevailing circumstances.7,8 It is easier said than done due to the complex interaction of man, machine and system in health care establishments. Deviation therefore is not uncommon. Despite these influences, reasonable standard can be maintained by quantification of service level, identification of gap (between delivered and planned care) and bridging the gap by taking improvement initiatives followed by regular monitoring and comparison with the preselected bench marks.7 Comparison of parameters however is most difficult task owing to the variation in patient population, critical care structure (e.g., rural vs urban, open vs closed and teaching vs community hospital),6 availability of resource, quality orientation and implementation level. Service offered should also be uniform and demonstrable.4

**Types of Indicators:** Survival of the patient is the ultimate objective therefore outcome parameters (mortality/ survival outcome) are given primary importance. However care level should also be judged on the basis of morbidity, safety issues, cost involved, compliance to processes and satisfaction level of patient and health care providers’. Certain commonly monitored indicators will be discussed in this article.

**Survival / mortality outcome:** Success of the unit to a great extent is judged by the outcome parameters. Joint Commission on Accreditation of Healthcare Organisations has also identified mortality of ICU patients in a hospital as the core measure.9 Crude mortality (Fig.1) even with a declining trend is not a very sensitive index of quality because it does not take into account severity of patient population managed in the unit. Higher success rate can be claimed if less seriously ill patients are managed whereas lower survival rate is inevitable with more seriously ill patients being treated in the unit. Correlation with the severity therefore is essential. It also helps in better prognostication. Comparative data of various institutions in relation to outcome and other quality parameters are readily available in developed countries. Web sites such as : “http://www.healthcarechoices.org/“ provide such information so that end users can take a conscious decision while selecting the hospital and its services. Unfortunately such information is not easily available in our country which makes the selection process difficult for the general mass.

Multiple scoring systems are available to correlate severity with outcome. However, consistency of result could not be proved in different studies with different scoring systems. Even standardised
mortality rate (SMR), calculated on the basis of observed versus predicted ratio of mortality, is influenced by both case mix and quality of care. This makes comparative analysis difficult. Proper data collection, matching the population under study and use of confidence interval can help overcome these limitations to a great extent.6,10 At least trend analysis of unit’s own data can be done as an easier alternative to evaluate performance level. It can be meaningful if systemic improvement projects or initiatives (SIP) are taken based on the trend analysis to ensure progressive improvement in the outcome. Projects could be taken in relation to infrastructure, organisation and patient management to reduce mortality rate.( Table 1, Fig. 1 & 2) Beneficial impact of SIP can be reassessed by subsequent monitoring of indicators.

Use of complex scoring systems can be labor intensive and might be difficult to use in absence of proper staffing and computer support. Simple scoring system like “organ failure mortality score”, despite the limitations, could be an easier option for most of the ICUs with limited resources. More complex scoring and SMR calculation can be incorporated in the performance evaluation process later on to further substantiate the outcome results. (Fig. 3) Less than one (Ratio <1) SMR generally indicates good outcome.

**Other outcome indicators:** Length of stay (LOS) and readmission rate are some of the other outcome parameters. LOS is often used not only to assess quality of care but also to find out the resource utilisation. Arithmetic mean of LOS in critical care unit of Tata Main Hospital, Jamshedpur (author’s unit) varies between 5.9-6.0 days for the last 4 years (2007-10). However, calculation of LOS based on the calendar days of stay and arithmetic mean could be misleading. Outliers influence the arithmetic mean therefore median and mode represents the LOS better. LOS calculation based on hours of stay is more specific but needs additional time if not automatically generated by the system. Alternatively calculation can be done on the basis of midnight stay. 6,7 LOS is also influenced by the case mix and admission - discharge process in individual setup. Availability of intermediary care or step down care also makes a difference. Absence of such facility increases the LOS as intensivist could be apprehensive in shifting and primary clinician could be equally hesitant in receiving the patient in ward due to wide gap in the level of care. Relatives also resist shifting of patient in such situations apprehending problem at ward level. This causes irrationally higher LOS due to blocked beds by patients.

who otherwise could have been transferred.7

Possibility of readmission in the critical care unit subsequent to ward transfer remains a concern but zero readmission should never be aimed at, as the discharge process becomes very defensive with this approach. Monitoring of readmission helps in identifying whether premature decisions are being taken leading to higher readmission or defensive approach is causing lower readmission but higher LOS. Readmission rate and LOS thus indicate process or operational efficiency of the unit and the hospital.7 Four to six percent readmission rate has been documented in the literature.6,11 If this is considered as the benchmark then individual units’ performance can be judged accordingly.

Despite apparent importance of LOS, its utility as sensitive indicator could not be supported by Joint Commission on Accreditation of Healthcare Organizations due to confounding issues associated with this indicator.6

**Morbidity indicators:** Unanticipated developments, which could also be iatrogenic, adversely influences patients’ outcome, length of stay and resource utilisation. Pneumothorax, pressure sores, nosocomial infections, renal failure, etc., cannot be prevented completely but can be reduced to a great extent if care providers are well trained and comply with the advocated processes. Efficiency of daily management gets reflected in form of morbidity rate. Monitoring of morbidity indicators is very important to judge the process efficiency of the unit. Improvement projects should be taken to reduce the morbidity rate and paramedical staffs should be encouraged to take up small group activities to ensure compliance to processes. By taking systemic improvement project in a multidisciplinary noncoronary critical care unit of Tata Main Hospital, denovo renal failure (severe acute renal failure developed in the unit needing dialysis) could be reduced to 1.68% in 2008 as compared to 2.56% in 2007. Twelve out of 474 and eight out of 468 patients developed renal failure in 2007 and 2008 respectively (unpublished data). Special attention must be paid to incidence of nosocomial infection and compliance to hand hygiene. Monitoring of pressure sore also shows efficiency of nursing care. Benchmarking with published data helps in evaluating level of process efficiency of the unit, provided case mix is comparable.7

**Patient and staff safety indicators:** Safety of both health care providers and the patient are important and should be addressed with equal concern. Personal protective equipment (PPE) for different procedures and type of patients should be used with 100 per cent compliance. Regular supply of PPE is management’s responsibility while compliance at user end should be ensured by regular training and monitoring.

Needle stick injury due to its potential to transmit infection should be a routinely monitored parameter. Since it is preventable, training of staff in handling the needles is of paramount importance.12 “Centers for Disease Control and Prevention”(CDC) reported 0.94 needle stick injuries per 10,000 venipunctures in USA in the year 2000.13 By constant monitoring and training, the incidence can be reduced to a great extent. Needle stick injury
from 0.87/1000 bed days in 2007-09 could be brought down to zero incidence in 2009-11 due to constant attention and training in the critical care unit of Tata Main Hospital, Jamshedpur.

Patients are quite vulnerable to errors related to medication, procedural lapses, and non compliance to protocols. Rothschild et al had reported all adverse events, preventable adverse events, and serious errors per 1000 patient-days as 80.5, 36.2, and 149.7, respectively in 2005. Among adverse events, 13 per cent (16/120) were life-threatening or fatal; and among serious errors 11 per cent (24/223) were potentially life-threatening. Medication error in particular is a major concern, as out of total errors 78 per cent had been related to medications only. Wide variation in medication errors have been reported (1.2 to 947 per 1000 patient-days with median rate of 105.9 per 1000 patient-days in adult ICUs). Underreporting of errors is very much possible particularly if care providers are scared of punitive action. Busy schedule, shortage of staff, unwarranted criticism, and monotony of data collection are the other common causes of underreporting of this vital parameter.

Unintentional fall of patient to the ground or a lower surface should also be monitored as the efficiency of care. Two different hospitals have reported 2.02 to 8.46 falls per thousand bed days with an injury rate of 0.22 to 12.85 per cent in USA. Comparatively better figures were observed in author’s unit (zero fall during 2009-11) due to preventive measures and constant attention by the nurses in the unit.

**Customer satisfaction indicators:** Satisfaction of patient and their relatives is very important. National survey in USA in the year 2008 showed 59-80 per cent satisfaction level to various parameters. Since most of the patients are not in a position to give feedback, feedback of relatives should be taken and assessed for satisfaction level. Such feedbacks are often perception based and not necessarily related to the actual level of care. However, impression about the unit’s efficiency is formed to a large extent by this perception therefore; significance of perceived care should be acknowledged by the care providers. Feedback can be taken on a predesigned format covering various aspects of care and communication. Last question in the feedback form should be open ended (such as “Do you want to communicate or suggest anything else”) to capture additional information. However, it often becomes difficult to request relatives to opine about the standard of care and processes when patients are fighting for their life. Satisfaction level is significantly influenced by the mindset of the relatives at the time of giving feedback, educational and expectation level, economic background, ultimate outcome and financial issues. Despite these influencing factors, relatives generally get satisfied if they appreciate seriousness of involvement of care providers in patient management, irrespective of the ultimate outcome. Meaningful, unambiguous and honest communication about patients’ condition on regular basis further helps in satisfying the apprehensive relatives. To ensure 100 per cent compliance to communication, documentary proof is maintained in the patients’ case sheet on daily basis in author’s unit. Patience and empathy must be exhibited while giving information to the relatives and it should never be left to junior most person or paramedical staff as mere ritual.

While focusing on patient satisfaction level, satisfaction of staff
providing the care should not be ignored. The staff should own the indicators and their contribution in bringing a positive change should be recognised in various forums. This helps in improving their involvement, commitment and satisfaction level despite the challenging and tiring job performed on routine basis. Monitoring of staff satisfaction as a parameter is also essential.

**Looking Forward**

Improvement in quality is an ongoing process. Various aspects of patient care should be quantified by different parameters (indicators) to identify the existing level and for targeting next level of care. Selection of indicators therefore is important. Certain basic parameters related to survival/mortality, morbidity, errors and satisfaction level should be monitored on regular basis. Based on the availability of resource and need, additional indicators can be monitored on short or long term basis. Culture of quality consciousness and competitiveness must be developed in the unit by constant monitoring, counseling and training to achieve desired result. Benchmarking with the published result/national data base (if available) is ideal but due to variation in case mix, infrastructure, manpower and other resources, it often becomes difficult to compare the results. Trend analysis of unit's own data over the years is suitable alternative but attempt should constantly be made to compare the results with appropriate benchmarks whenever possible.

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